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## PREFACE.

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THE contents of the present volume consist, for the most part, of descriptions and notices of the various subjects for which the Society have bestowed medals or pecuniary rewards during the last session.

From a perusal of these, the public in general, and those members who are prevented from personally taking a part in the proceedings, may be convinced that no remission has taken place in the activity of the Society, or in the readiness of ingenious persons to submit their inventions to its judgment.

In the class of Agriculture and Rural Economy, the large gold medal has been given to Ralph Creyke, Jun., Esq., for warping, by an improved method, four hundred and twenty-nine acres of peat. It is chiefly on the shores of the Humber that the process of

warping has been practised. The muddy water of this great estuary is admitted at spring-tides, through a sluice, into an embanked canal, and is thence distributed, by lateral cuts, into compartments, about twenty acres in extent, of barren or exhausted land, where it deposits the fine silt with which it is charged, and is then returned into the river. By this means, in the course of a year, the land so treated is covered with a deposit, from twelve to fifteen inches deep, of highly fertile soil. A tract of absolutely unproductive peat moss, sixteen hundred acres in extent, was selected by Mr. Creyke as the object of his magnificent operations : it was divided into three large compartments of nearly equal area ; a wide canal admitted the waters of the river not only at spring-tides, but at every tide when other circumstances were favourable. The warping began in the latter part of the year 1821 ; four hundred and twenty-nine acres were covered with a deposited soil to the depth of three feet, and were sown with oats and seeds, in 1823 ; the second portion, of about five hundred acres, was completed in the spring of 1825 ; and in a year from that time the remainder of the undertaking will, it is expected, be accomplished. The first portion bore a crop of wheat

this year ; and land, which four years ago produced no rent whatsoever, is now worth to the proprietor at least thirty-five shillings an acre per annum. If the sixteen hundred acres of waste thus reclaimed had been the only tract capable, by its local situation, of this improvement, Mr. Creyke would have well deserved the medal of the Society for his successful exertions ; but it appears that there are thousands of acres of barren peat moss similarly circumstanced, and to a great part of these it is highly probable that this gentleman's improved mode of warping will be ultimately extended.

The gold medal of the Society has been also given to Colonel James Wilson for his plantations of forest trees, to the amount of 174 acres and a half, in the neighbourhood of Sneaton Castle, near Whitby.— In granting their rewards for plantations of forest trees, the Society have two objects in view ; one to mark with their approbation the conduct of those who occupy with plantations such waste land as will bear no other crop, and the other, by registering in their volumes the date and particulars of such plantations, to afford hereafter valuable information respecting the

comparative growth of timber on various soils and under different circumstances.

For the last four years the Society have endeavoured to improve the straw-plat manufacture of the country, with a view of raising it to an equality with that of Tuscany. They first introduced and distributed seeds of an American grass used for this purpose in Connecticut; they next encouraged experiments for the purpose of ascertaining whether any of our own native grasses might be advantageously used instead; they have also endeavoured to collect accurate information respecting the variety of wheat actually employed in Tuscany as the material of their fine plat, and to obtain seeds of the same. The Society's premium of twenty guineas for seed of the American grass raised in this country, has been successfully claimed by Messrs. Cowley and Staines; and the silver Ceres medal has been voted to Mr. Salisbury for his interesting communication respecting the Tuscan wheat, derived partly from his own cultivation of the plant from seeds given to him by H. R. H. the Duke of Sussex, and partly from information obtained for him by M. Tournier during his journey in Tuscany.

The silver Ceres medal, the premium for an improved variety of perennial ray-grass, has been awarded to Mr. Whitworth : specimens of the plant and seeds were exhibited before the Committee of Agriculture, and from the concurring testimony of those farmers who have cultivated Mr. Whitworth's grass, it appears to be decidedly superior to any other known varieties.

In the class of Chemistry, the large silver medal and fifty guineas have been given to John Roberts, a working collier, of St. Helens, in Lancashire, for his apparatus to enable persons to breathe in air loaded with smoke and other suffocating vapours. Of the substances which compose our atmosphere the respirable portion amounts to about twenty-one per cent. of the whole mass; of the remaining seventy-nine parts about seventy-eight are an elastic fluid not capable of supporting life, but at the same time exerting no actively deleterious properties; one per cent. only consists of gas decidedly noxious if respired undiluted. Nothing can compensate for a considerable deficiency in the usual proportion of the respirable part of the atmosphere, but it often occurs that air is rendered completely noxious by the mixture of

various irritating vapours or minute floating particles, which, producing a convulsive cough, prevent respiration, although there is nearly the usual quantity of respirable air present. Of these substances some are separable by mechanical filtration, and others are capable of being absorbed by water; while there are others not removeable by either of these methods.— Roberts's apparatus consists of an air-tight hood which covers the head (having glazed apertures in front of the eyes), and prolonged into a pipe or trunk considerably expanded at the extremity: this extremity is covered with thick woollen cloth, and the expanded part is nearly filled with sponge. When the end of the pipe has been dipped for a few seconds in water the apparatus is ready for use; and the committee were witnesses to an experiment in which a close chamber was filled with wood-smoke and the vapour of burning sulphur so as to be completely suffocating: the candidate, with the apparatus on, then entered the chamber, and remained enveloped in the smoke for more than half an hour, without sustaining any material inconvenience, except what arose from the heat. The result of this experiment, considered merely as a philosophical fact, is very inter-

esting, and in its probable practical applications is extremely important. It offers to firemen and others the means of penetrating into parts of buildings on fire, and especially of ships, which otherwise, from the suffocating effect of the smoke, would be inaccessible, in order to extinguish the flames or to rescue valuable property ; and is also applicable in various manufacturing processes, to protect the persons engaged in them from inhaling dust or vapours prejudicial to health.

The large silver medal has been given to Mr. H. Moore for his mode of etching on and cleaning vases and other articles of alabaster ; which he effects by availing himself of the solvent power which pure distilled or rain-water exercises on this substance.

The silver Vulcan medal and twenty guineas have been voted to Mr. Anstey for his improved melting-pots for the use of iron and brass founders. The pots are made of Stourbridge clay and gas-coke. On comparative trials of them with the pots now in use for the same purposes, they appear to be much less liable to crack or to break by a casual blow, and to

be far more difficult of fusion, qualities the value of which will be duly appreciated by all those artists who may have occasion to use them.

The large silver medal and thirty guineas have been given to Mr. W. Sturgeon, for his improved electro magnetic apparatus, which he effects by greatly diminishing the size of his galvanic battery, (a part of the apparatus which is usually the most expensive and troublesome to manage), by his simple and ingenious mode of keeping it always when wanted at a maximum of action, by proportionably increasing the magnetic power, and by his use of horse-shoe magnets instead of straight ones, by means of which he exhibits simultaneously with one magnet the reverse motions which take place at each pole. The experiments are also shown on a larger scale than usual, though with a far less cumbrous apparatus, and therefore are peculiarly adapted for exhibition in the lecture room.

The thanks of the Society have been given to Captain Bagnold for his successful application of a well-known process to the preservation of the juice of limes

and lemons for sea store, without the use of rum or other spirits.

Finally, Mr. H. Hennell has contributed a notice of a comparative analysis, made by him at the request of the Society, of the proportions of morphia contained in British and in Turkey opium, completely confirming the opinions of medical practitioners deduced from the effects of the two upon the human body.

In the class of Mechanics the sum of ten guineas has been given to Mr. Friend for his secret lock; it is on the general principle of the letter locks, but by means of a moveable scutcheon it avoids many of the objections that are usually urged against locks of this construction.

The silver Vulcan medal has been given to Mr. J. P. Hubbard, for his folding chair. Its great simplicity, its extraordinary firmness, the ease with which it is folded, and the small space which it then occupies, are likely to make it a very useful article of furniture on board ship or in camp, and in any other situation

where economy of space and easy portability are objects of any importance.

Mr. C. W. Williamson has had the sum of ten guineas presented to him for an improved smoothing-plane for wooden blocks to be engraved on. The inventor is a working man, and therefore of a class from whom suggestions with regard to the improvement of tools are always received with great complacency by the Society; not only because it is very desirable to encourage ingenuity in such persons, but because none are so likely to make real improvements in tools as those who are in the daily habit of handling them.

The silver Vulcan medal has been given to Mr. T. Griffiths for his expanding wedge for the use of sawyers. In the common way of sawing up a balk into planks, when a cut of a foot or two has been made, a wedge is inserted in order to separate the two cut surfaces from each other, lest they should close upon the saw and impede it. The wedge requires fresh adjustment every two or three feet, and the time thus employed amounts, at the end of the day, to a quantity which it is well worth while to save. The angle of

**Mr. Griffiths's wedge** is formed of two springs which are compressed when the wedge is first inserted into the cut, and which continually expand in proportion to the progress of the saw, requiring only one adjustment for every twelve feet of cut. It is the opinion of the sawyers who have tried it, that the amount of the saving will be about a shilling a day for each pair of men.

The silver Vulcan medal has been given to Mr. David Matthews for his improved mode of barrowing out soil, as practised by him in clearing the harbour of Bridlington, in Yorkshire. It requires rather less horse power than is usually wanted, as the man is not drawn up together with the barrow, and the serious accidents that not unfrequently arise are thus avoided.

The sum of five guineas has been presented to Mr. E. Pechey for his pump for raising water. One has been put down by him at Bury St. Edmunds, which brings water from a depth of ninety feet. There are two sets of pump rods balancing each other, in which circumstance, and in the mode of joining the different

lengths of pipe, the chief novelty of the invention consists.

The gold Vulcan medal has been awarded to Mr. F. Cluley for a forceps to be used in the operation of lithotomy.

The large silver medal has been given to William Brockedon, Esq. for his mechanical apparatus to assist a weak knee joint.

The sum of twenty guineas has been given to Mr. J. Aitkin for his improved striking part of a quarter clock. The usual combinations have been greatly simplified by this ingenious artist, and his contrivance obtained the unanimous approbation of all the clock-makers who were summoned on the committee.

To Mr. W. Hardy the gold Vulcan medal has been awarded for his instrument for ascertaining very minute intervals of time. The Society have already had the credit of rewarding, and of publishing to the world, his unrivalled astronomical clock, and his inverted pendulum for rendering sensible very small quantities

of vibration. The present instrument was originally constructed for the use of the artillery officers at Woolwich, to determine the flight of shells and other projectiles. It divides a second of time into three hundred equal parts, and though liable to some objections from slight variations in the length of the arc described by the pointer when the spring is in a state of tension or comparative relaxation, has, nevertheless, been thought worthy of presenting to the public.

The large silver medal has been awarded to Captain T. Dickinson, R. N. for his mode of applying percussion powder to the discharge of ships' guns. Every sportsman well knows the advantage in rapidity of fire which a gun discharged by percussion powder possesses over one to which fire is communicated in the old way by means of common priming. In naval actions, where the gun and the object aimed at are both in constant motion, it is obvious that correct aim can be had only for an instant, and therefore that most balls so discharged, even when vessels are only a few hundred yards from each other, will miss their mark. Captain Dickinson, with a laudable attention

to the interests of his profession, has adapted the percussion principle to ship's cannon ; from which, if employed, will result some saving of powder, some shortening of the time of naval actions, and some additional advantage to that party which is the coolest and best disciplined.

The gold Vulcan medal has been given to Mr. Cow, for his improved mode of conveying anchors by means of a ship's launch. The usual mode of effecting this is to place the anchor in the boat's stern, and to coil the cable on the gunwale ; but this lumbers up the boat, overloads it, and exposes it to the imminent hazard of being swamped in a high sea. To obviate this very pressing danger, attempts have at times been made to sling the anchor beneath the boat, as near as possible in the centre of gravity ; none of these, however, succeeded so as to encourage their adoption. Subsequently Mr. Cow took the matter in hand, and by very simple but effectual arrangements, obtained results so satisfactory as to induce the Navy Board to direct that every ship of war of a particular class shall be furnished with a launch fitted up on Mr. Cow's principle. On such evidence of the

utility of the invention the Society had no hesitation in bestowing their reward.

The gold Vulcan medal has been granted to Mr. A. Ainger for his improved centering for arches of wide span, a model of which, of considerable size, was made the subject of experiments by the Committee of Mechanics. The obvious difference between Mr. Ainger's centering and those that have hitherto been used, consists of the introduction into the former of iron bars, for the purpose of taking off, by their tension, much of the strain that would otherwise be thrown on the timbers. This enables him to employ not more than one-third of the customary quantity of timber, by which not only is a great saving of expense effected, but the timbers that are retained are not wounded, and consequently weakened, by the crossing of others, as is usually the case. Another and very important advantage is, that it has little or no tendency to rise in the crown when loaded on the haunches, and therefore requires no counterpoising weight on that part.

The large silver medal and ten guineas have been

given to Mr. C. Sockl, for his new safe valve for steam boilers. The object of this valve is not so much to regulate the working pressure of the steam, as to act in aid of the common valve, by affording an additional aperture in case the steam should acquire a dangerous degree of elastic force. It differs from the plug-valves in common use in this circumstance, namely, that in the latter the plug rises out of its socket in order to allow a vent for the steam, whereas in Mr. Sockl's the socket rises away from the plug : the chief advantage resulting from this is, that if any adhesion should have taken place between the plug and socket it is more likely to be overcome, on account of the great surface of the socket, with its attached copper plate, which are exposed to the action of the steam.

The gold Vulcan medal has been awarded to Colin Shakespear, Esq. postmaster-general of Bengal, for his portable rope-bridge, a model of which is in the Society's possession. A few bamboos and trees of moderate size (such as every water-course in India afford), constitute all the timber required ; the other materials consist of rope, in convenient lengths for

carriage on the backs of bullocks, and capable of being united together by hooks and eyes of metal. The general principles of its construction are the same as those of the chain bridges, modified, however, so as to combine the greatest simplicity and portability, qualities which admirably adapt it to civil as well as military use in India and other tropical countries, where, during the periodical rains, every water-course is swelled to a dangerous impassable torrent, while, during the rest of the year, it is either dry or fordable without difficulty. Three bridges on this plan have already been constructed. The first, after being set up for public inspection on the Esplanade of Calcutta, was taken to pieces, and transported eighty miles on the backs of bullocks to a torrent on the road to Benares, where it was set up in twenty-four hours, and preserved the communication entire during the whole of a very stormy monsoon without sustaining the smallest injury. For the picturesque view of this bridge, which forms the frontispiece to the volume, the Society are indebted to the liberality of two of their members, viz. C. Varley, Esq. who presented the drawing, and R. H. Solly, Esq. who defrayed the expense of the engraving and printing.

The thanks of the Society have been presented to Capt. T. M. Bagnold, for his communication of a description received from his brother, Capt. M. E. Bagnold, of the process employed at Bombay for forging swords and twisted gun-barrels in imitation of those made at Damascus.

In the class of Polite Arts, the thanks of the Society have been presented to Mr. Edmund Turrell, for an account of the method employed by him of making etching-ground for engravers; being a continuation of his paper on etching upon steel, inserted in the last volume. And the silver medal and fifteen guineas have been presented to Mr. Savage for his successful imitation of tinted drawings by block printing in colours.

In the class of Manufactures, the silver Ceres medal and five guineas have been voted to Mr. R. Jones, for cloth made of New Zealand flax. The plant commonly, though improperly, called New Zealand flax is perennial, and its leaves produce a larger proportion of fibre than any other known plant does. It has grown and flourished in gardens both in the south of England and in Ireland, without re-

quiring more care than other hardy herbaceous plants. The strength of the cordage made from it is well known, and induced the Society last year to offer a premium for its extended growth in the British islands. The excellent cloth which Mr. Jones has manufactured of it furnishes an additional motive for its cultivation.

In addition to the rewards already bestowed in the class of Agriculture to improve the manufacture of fine plat, the Society have voted several medals and pecuniary bounties for hats and bonnets platted after the manner of those from Leghorn, and made either of our native grasses, or of spring wheat, diminished by being sown very thick for this express purpose.

In the class of Colonies and Trade, the gold Ceres medal has been awarded to J. M'Kay, Esq. of the colony of Nova Scotia, for his apparatus for uprooting the stumps of trees, by which he clears the ground for cultivation in a more effectual manner than that at present practised, namely, of felling the trees a foot or two above ground, and leaving the butts and roots

to encumber the soil for years till removed by the gradual process of natural decay.

The gold Ceres medal has also been voted to Messrs. Petchey and Wood of Van Dieman's Land, for making and exporting five tons of extract of mimosa bark for the use of tanners. This is the second premium given by the Society for this subject; it appearing to be of great importance to encourage the production in our own colonies of an article which our extended connexions with South America render more and more necessary; at the same time that it is likely to check the improvident destruction of young oaks for the sake of their bark, and to render possible a return to the old method of felling and seasoning ship-timber, which probably is the most effectual way to check the ravages of dry rot in our navy.

The sum of fifty guineas has been granted to M. le Cadre of the island of Trinidad, for his successful exertions in forming a plantation of clove trees in that colony: a few of his trees have last year become productive, and the quality of the cloves, after a rigo-

rous examination by the best judges of the article in London, has been pronounced to be scarcely inferior to those from Amboyna, which have always ranked the highest in the European markets.

A second edition of the Society's Report on the best means of checking the forgery of bank-notes being in preparation, a request was made to Messrs. Perkins and Heath to allow the insertion of one of their most recent bank-note patterns. The wish of the Society was immediately complied with. A specimen was furnished of such beautiful execution and so difficult of imitation, that an order was given for its insertion in the present volume, as well as in the new edition of the Report. The principles on which the bank-note plates of the above-named gentlemen are formed, have already been detailed in the 38th volume of the Society's Transactions, accompanied by specimens : on comparing them with those inserted in the present volume, it will be seen how great an improvement has taken place in the practical application of those ingenious processes by which the notes composed by Messrs. Perkins and Heath are characterized.

The Society have also directed the publication in the present volume of a very interesting account by A. Stephenson, Esq. of the culture of silk in the south of France. The memoir has been for several years in the Society's possesion, and is now printed as likely to be of material service to those who are turning their attention to the growth of silk in England and the British colonies.

The friends of the Society will be gratified to hear that one hundred and fifty-three new members were elected during the last session.